LOBSTER RESEARCH PROGRAM

MAINE DEPARTMENT OF MARINE RESOURCES

"LOBSTER TAGGING STUDY"

by

Jay S. Krouse

Lobster Informational Leaflet #5

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In recent years concern for the future well-being of the inshore Maine lobster fishery has intensified as the result of increasing levels of fishing effort and generally declining catches. In response to this regard for Maine's most valuable commercial fishery, the Lobster Research Project of the Department of Marine Resources, which originated in 1966, has extensively studied various aspects of the fishery and biology of the lobster. Even though information from these investigations has provided a basis for the scientific management of the lobster resource, DMR recognized the need for additional research to: 1) substantiate previous findings; 2) monitor any changes within the fishery; and 3) fill the gaps of knowledge necessary to effectively manage the stock.

One important area with a scarcity of information which is of interest to the fishermen and fishery managers alike is that of lobster movement along the Maine coast. Up to now there have been only three rather small scale tagging studies with Maine lobsters. Two of these tagging projects which were conducted off Monhegan Island by D. Harriman of DMR in the early 1950's and R. Cooper of NMFS in the mid 1960's, indicated that lobsters were nonmigratory since most returns were within a two mile radius of the island. In contrast, 5 of 162 lobsters tagged by Maine fishermen for R. Dow of DMR (1957-59) traveled 75 to 138 nautical miles in a south by southwesterly direction. As 4 of these distant wanderers exceeded the maximum legal size, it appears that larger lobsters are more likely to undergo extensive movements.

In view of the limited tagging work performed heretofore with Maine lobsters and the importance of tagging information for formulating meaningful management recommendations, DMR undertook a large scale, coastwide

tagging project. This study was intended not only to furnish data on movement but also information on growth and mortality resulting from fishing.

In order to accomplish these objectives, particularly that of growth, a tag capable of remaining with a lobster through the shedding process had to be used. Based on the success of other researchers with the so-called sphyrion tag, which has demonstrated the capability of being retained through a molt, it was selected as the primary tag. Our tag consisted of a flexible yellow PVC tube (about 1/8 in. diameter by 2-1/4 in. long) attached by a thin polyethylene thread to a 1/4 in. long stainless steel anchor. The tag's anchor was implanted with a hypodermic needle through the thin membrane joining the tail and carapace (back shell) into a small band of muscle tissue (Fig. 1). This particular location is used because this is where the shedding lobster exits from the old shell.

Because some of the sphyrion tags were certain to be lost prior to shedding, a second tag (cinch-up) was secured to the pincer claw. By using two tags it would then be possible to estimate the amount of tag loss which in turn would be useful in refining mortality estimates.

After selecting the tags, informative legends were determined for both tag types. These legends were intended to provide adequate incentive and information to stimulate and facilitate reporting of tagged lobsters. Each tag was sequentially numbered to enable coding to a specific lobster.

Understanding the success of a tagging study is dependent upon the quantity and quality of publicity given the investigation, we attempted to alert the fishing community of our study by news releases and reward posters which were personally distributed along the Maine coast. Selected

dealers and fishermen in New Hampshire, Massachusetts, and Rhode Island also received posters.

Because the characteristics of the Maine lobster that we intended to define by tagging could vary along the lengthy coast of Maine, three tagging sites were selected. Kennebunkport (K-port), Boothbay Harbor (BBH), and Jonesport (J-port) were chosen on the basis of geographical location and availability of lobsters for tagging.

In each tagging area certain lobster dealers were contacted and arrangements were made for the purchase of about 1,000 lobsters. These lobsters were to be boat-run (not sorted by size) and native to the area where they were purchased. These requirements would ensure that the tagged lobsters were representative in size of those lobsters commercially harvested and, being native, perhaps less apt to deviate from the norm in terms of movement and/or migration and, possibly vulnerability to fishing gear.

On 28 April 1975 the first phase of the tagging operation began aboard the 43 ft. R/V Duchess docked in the Kennebunk River at K-port. Before each lobster was tagged, carapace length (CL), weight, sex, and any other pertinent observations were recorded with the corresponding numbers of both tags. After attachment of the tags, each lobster was held in "solitary confinement" until tagging was completed within an area and then all lobsters were liberated simultaneously.

On May 6, after tagging for six days, 957 lobsters were released about two nautical miles seaward of the mouth of the Kennebunk River. Next in Boothbay Harbor, 942 tagged lobsters were freed on 17 May 10 miles south of the harbor. Then on 30 May, 983 lobsters were released

12 miles southwest of J-port.

Within days after each release, tag returns were received and literally "poured in" throughout the summer. When a recapture was reported, arrangements were made for its retrieval. Upon receipt of the tagged lobster, the fisherman was paid a cash reward and then the lobster was transported to the laboratory where tag numbers were recorded with the lobster's vital statistics. These new measurements were checked against those recorded at tagging. Data and location of capture were also noted, along with observations such as missing tag and/or claw(s), soft shell, egger, etc.

As can be seen from the tag return dates in Table 1, lobsters from all three areas were recaptured at an extremely high rate. These high monthly returns, whether considered separately by area or combined, vividly show the lobster fishery's high rate of exploitation. Four months after release, 53 to 75% (65% combined) of the lobsters had been returned in each area and after one year 65 to 85% (75% combined) had been recaptured. To date, of the 2,882 lobsters tagged, a total of 2,188 (75.9%) have been caught.

When considering the aforementioned returns, one should realize that the number of returns have been slightly reduced by: 1) tag loss; 2) incomplete reporting of recaptures; and 3) natural and tag induced mortality. Based on observations of lobsters immediately following tagging and our close association with the fishing community, it appears that only a negligible number of lobsters died as a result of tagging or were recaptured and not reported. Thus tag loss and natural mortality were probably the greatest factors contributing to reductions in returns.

Movement of recaptured lobsters was initially assessed by plotting points of return for each release site (see Figures 2,3, and 4). In K-port (Fig. 2), most lobsters were caught close to shore within a 5 mile radius of the release site. Only 14 recaptures went more than 5 miles and 10 of these lobsters moved in a southerly direction. The most notable treks were for a male with a 90 mm CL that traveled 63 miles to Boston Harbor in 369 days and an 88 mm CL female that was allegedly caught off Tiverton, Rhode Island (185 mi.), 199 days after release.

In BBH (Fig. 3) most lobsters moved inshore between the mouths of the Kennebec and Damariscotta Rivers. Only one return came from the Damariscotta River while not a single return was noted for the Kennebec River. In contrast, numerous tagged lobsters were evidently allured into the Sheepscot River estuary. In fact, 12 lobsters moved more than 10 mi. up river. Movement toward the east and south was minimal - exception being for one return near Monhegan Island (14 mi.), another at Cape Porpoise (42 mi.) and a third at Jeffreys Ledge (61 mi.).

Compared to the other areas, J-port recaptures showed more easterly movement (Fig. 4), yet most returns headed inshore as did those lobsters at BBH and K-port. The longest trips were for lobsters that traveled southwesterly and were caught near K-port (89 mm CL, male [134 mi.]), Schoodic Head (96 mm CL, female [20 mi.]), and Great Duck Island (81 mm CL, male [29 mi.]).

Next we considered how far the recaptures moved. Statistical tests showed that while males and females covered about the same distances, the average miles moved by returns in BBH (4.5 mi.), J-port (2.7 mi.), and K-port (2.2 mi.) were significantly different. These variations are

associated with the nearness of the release site to the neighboring trap fields and the configuration of the coastline. For example, in BBH where lobsters moved the farthest, the liberation point was not only farther from shore, but also more removed from zones of moderate to intense fishing pressure.

Another factor likely to be related to movement, particularly in view of this study's rapid recovery rate, is the time lobsters were at large. Average days at large were 51.8 for J-port, 70.5 for K-port, and 86.1 for BBH. Considering BBH lobsters were at large the longest and moved the farthest (mean = 4.5 mi.), one might erroneously conclude that there is close association between time at large and distance traveled. However, where distance traveled is compared to time of recapture, it becomes apparent that there is little association between time at liberty with the extent of movement. For example, lobsters caught after one year had not on the average moved any farther than those individuals captured soon after release.

As mentioned before, there is evidence from other studies that larger lobsters are more likely to be migratory. However, in this present study we did not detect any differences in movement between the smallest and largest lobsters tagged. Of course, it should be remembered that the largest lobster tagged was 116 mm CL (4.6 in.).

In summary, results of this investigation indicate that: 1) the lobster fishery is being subjected to extremely high levels of exploitation; 2) most coastal Maine lobsters within the legal size range are generally nonmigratory, yet undergo extensive localized movements; and 3) long distant migrants (exceeding 20 mi.) followed a south to south-

westerly course, probably resulting from the counterclockwise coastal currents.

The Lobster Project would like to take this opportunity to thank the many lobster dealers and fishermen who, often at an inconvenience to themselves, supported our program by reporting returns and providing pertinent information. Without your fine cooperation this project would have certainly failed and valuable information which will be used to conserve your fishery would have been lost.

Table 1. Monthly tag recovery information by area, May 1975 through May 1977.

Month	Kennebunkport Recaptured Number	Kennebunkport Cumulative %	Boothbay Harbor Recaptured Number	Boothbay Harbor Cumulative %	Jonesport Recaptured Number	Jonesport Cumulative %	Total Cumulative %
1975							
May	136	14.2	18	1.9	-	-	5.3
June	244	39.7	176	20.6	315	32.0	30.9
July	119	52.1	160	37.6	285	61.0	50.4
August	132	65.9	145	53.0	132	74.5	64.6
September	39	70.0	58	59.1	60	80.6	70.1
October	17	71.8	33	62.6	29	83.5	72.8
November	11	72.9	9	63.6	9	84.4	73.8
December	5	73.5	10	64.7	0		74.3
1976							
January-December	11	74.6	26	67.4	7	85.2	75.9
1977							
April-May	2	74.8	0		0		75.9
TOTAL	716	74.8	635	67.4	837	85.2	75.9

Table 2. Distances traveled by tagged lobsters recaptured from each of the release areas.

Nautical Miles Traveled	Kennebunkport Cumulative		Boothbay Harbor Cumulative		Jonesport Cumulative	
	Number returned	% returned	Number returned	% returned	Number returned	% returned
0-2	472	66.3	103	16.5	426	52.0
3-5	698	98.0	459	73.6	749	91.5
6-8	707	99.3	605	97.0	810	98.9
9-11	710	99.7	618	99.0	811	99.0
12-14	710	99.7	621	99.5	815	99.5
$\geq$ 15	712	100.0	624	100.0	819	100.0

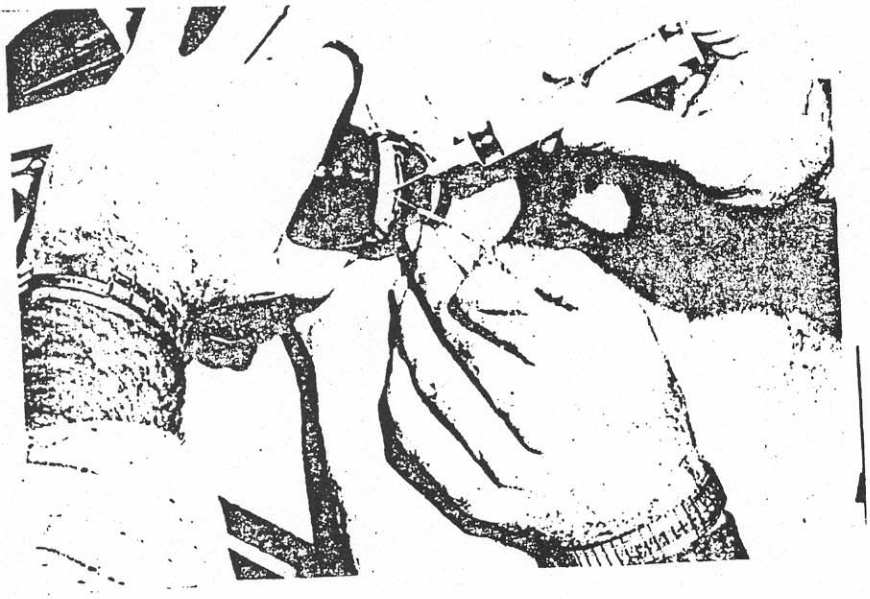

Figure 1. Application of the sphyrion tag.

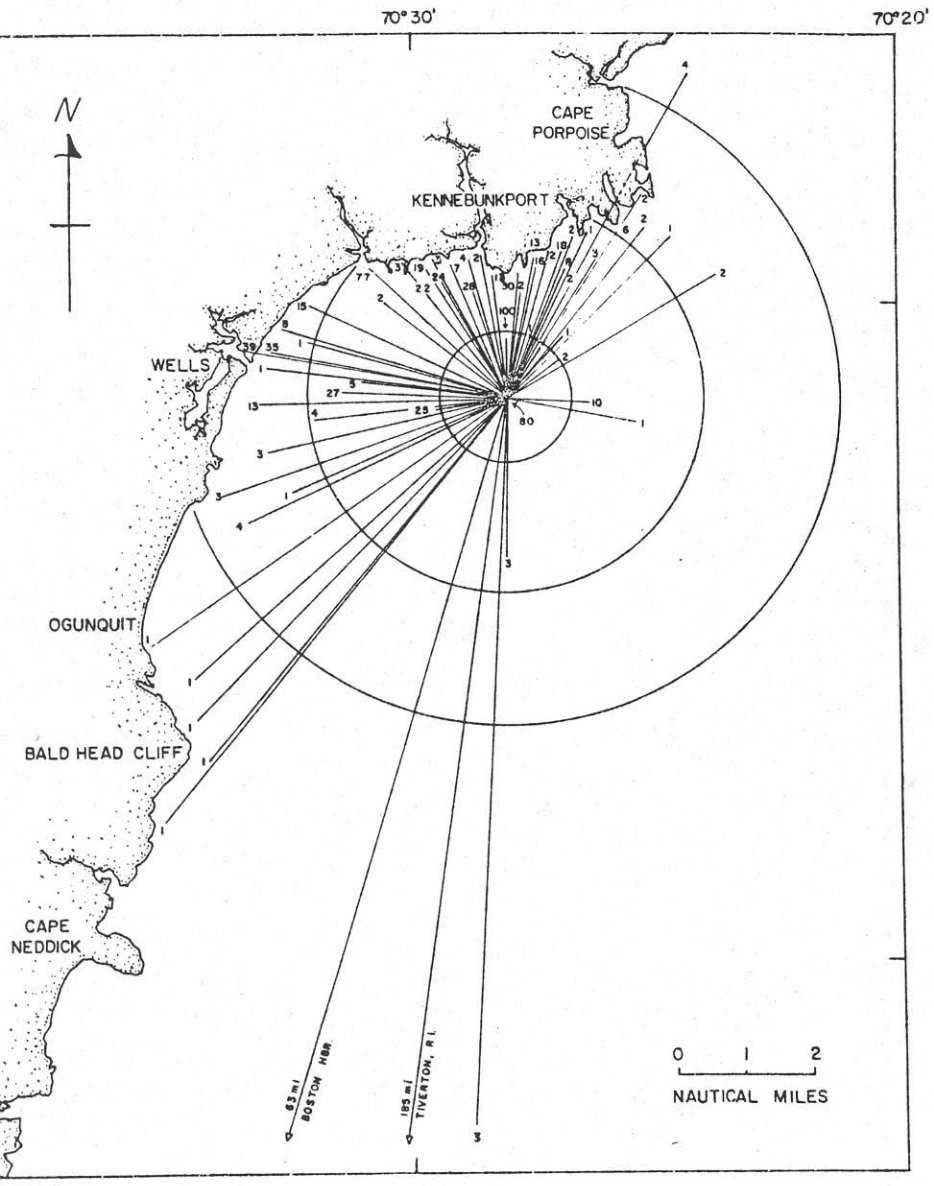

Figure 2. Chart of Kennebunkport showing the dispersal of tag returns. Number of recaptures are listed at each point.

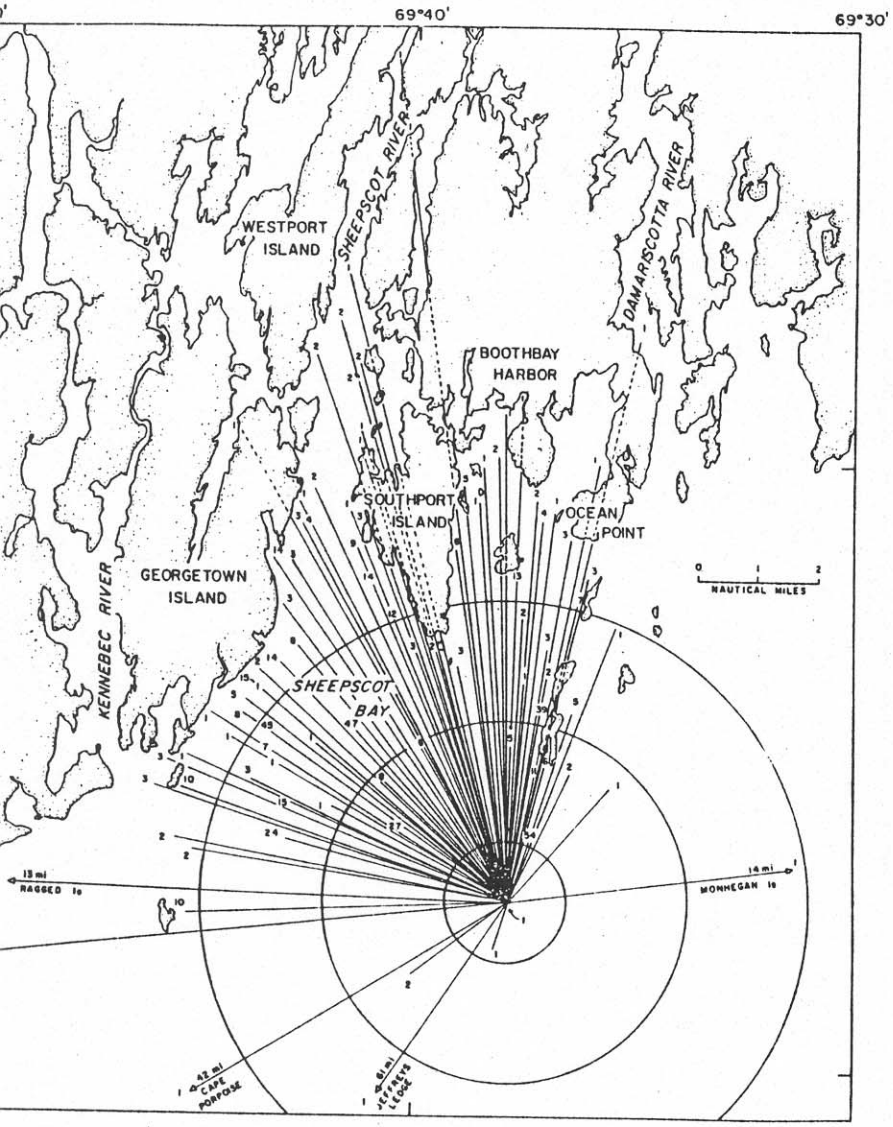

Figure 3. Chart of Boothbay Harbor showing the dispersal of tag returns. Number of recaptures are listed at each point.

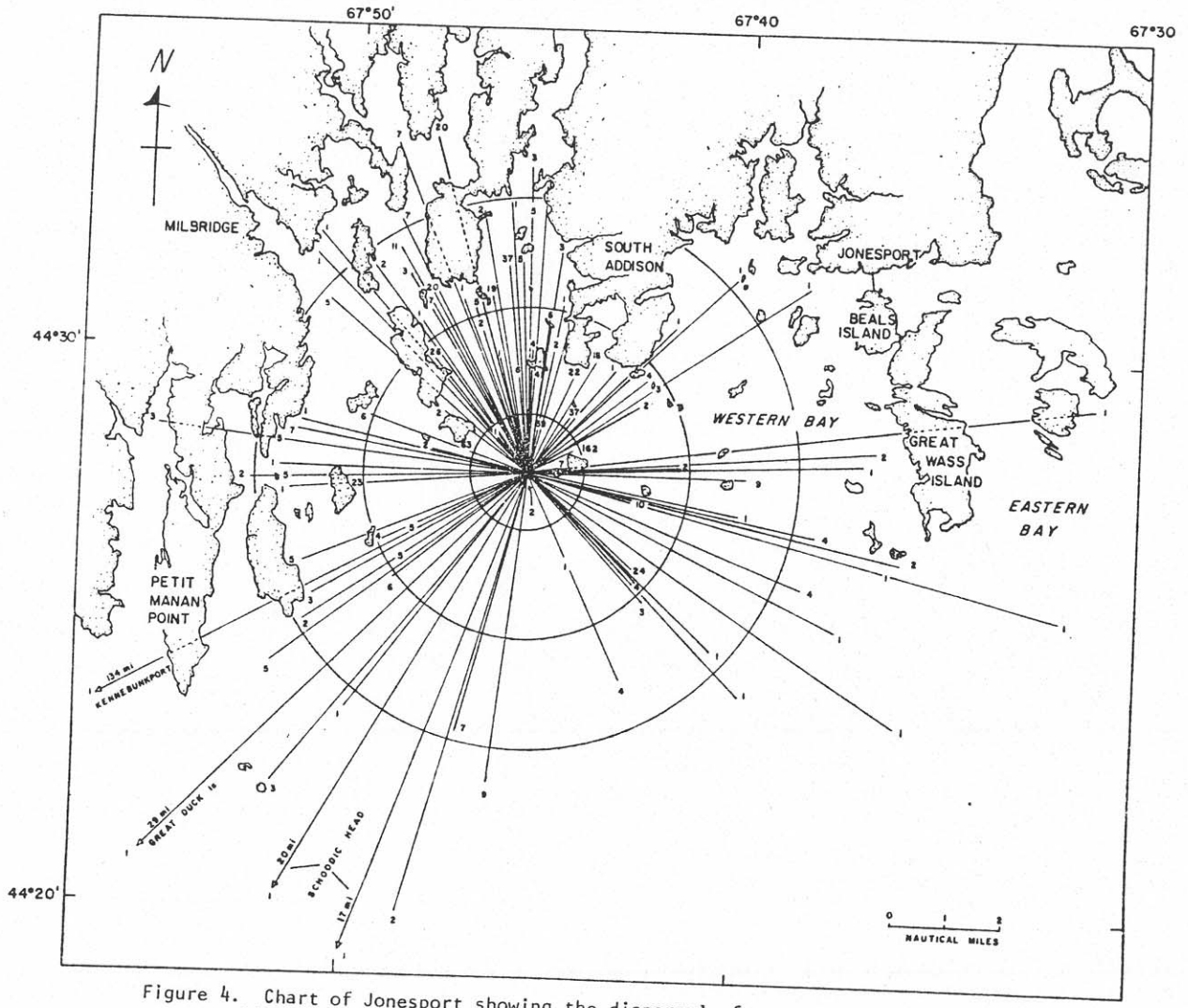

Figure 4. Chart of Jonesport showing the dispersal of tag returns. Number of recaptures are listed at each point.